

KAPOHO REEF WATCH
AT THE WAI'OPAE TIDE POOLS

HUMAN USE PRELIMINARY RESULTS
YEAR FIVE

SUMMER 2007

Cape Kumukahi Foundation

Linda Shea Flanders
Executive Director

October 15, 2007

MAHALO

Mahalo to all who have participated in or supported this important project at Wai'Opae tide pools in Kapoho, Hawaii over the past four years. This "makai watch" project was led by the Vacationland Hawaii Community Association in Year One (May 2003-April 2004) and subsequently by the Cape Kumukahi Foundation, a 501(c)(3) charitable organization. Pua Medeiros collected and analyzed the human use data during the summer of 2007 and continues to serve as a reef steward at Wai'Opae.

Funding to enable the first half of the fifth year of the Kapoho Reef Watch Program was provided by three organizations. The Community Conservation Network provided approximately \$3,000 (out of their \$12,000 contract in June 2006). The Hawaii Department of Land and Natural Resources provided approximately \$7,000 out of their \$10,000 purchase order in April 2007. The University of Hawaii at Hilo provided a Hawaiian student as an intern for the program during the summer through their Pacific Internship Programs for Exploring Science (PIPES). She was funded by Alu Like, Inc. and Kamehameha Schools 'Aina Ulu.

We appreciate the continued interest and collaboration of the Vacationland Hawaii Community Association (VHCA) in helping to conserve the Wai'Opae tide pools. They initiated a new visitor education and control program on Memorial Day weekend in 2006 that included additional public parking restrictions and signage, educational signage and brochure, a security camera at the entrance to the neighborhood, and a security guard on the very busiest of holidays and some Sunday afternoons. They obtained grant funds from the Hawaii Tourism Authority, matched by VHCA Special Assessment funds, to continue and expand their visitor management initiative in 2007 to include a security guard every weekend day and the busiest holidays.

Linda Shea Flanders and Pua Medeiros collected data to document human use patterns at the Wai'Opae tide pools and to educate the public about the importance of protecting the shallow coral reef and complying with the statewide fishing and MLCD regulations. They encouraged the public to comply with the State rules and pack out all of their human, animal and other waste materials. They reported fishing violations to the Department of Land and Natural Resources - Division of Conservation and Resource Enforcement (DLNR-DOCARE).

The DLNR-DOCARE has remained very responsive to our reports of violations. The officers who have most frequently provided on-site enforcement in response to our calls over the past year have been Andy Ford, Lenny Terlip Jr., and John Robello. We sincerely thank them for their collaboration with our makai watch project. The success of local makai watch projects depends in large part on the ability of DLNR-DOCARE to fulfill their enforcement responsibilities when community-based public education programs fail to convince some people to comply with the state rules.

METHODS

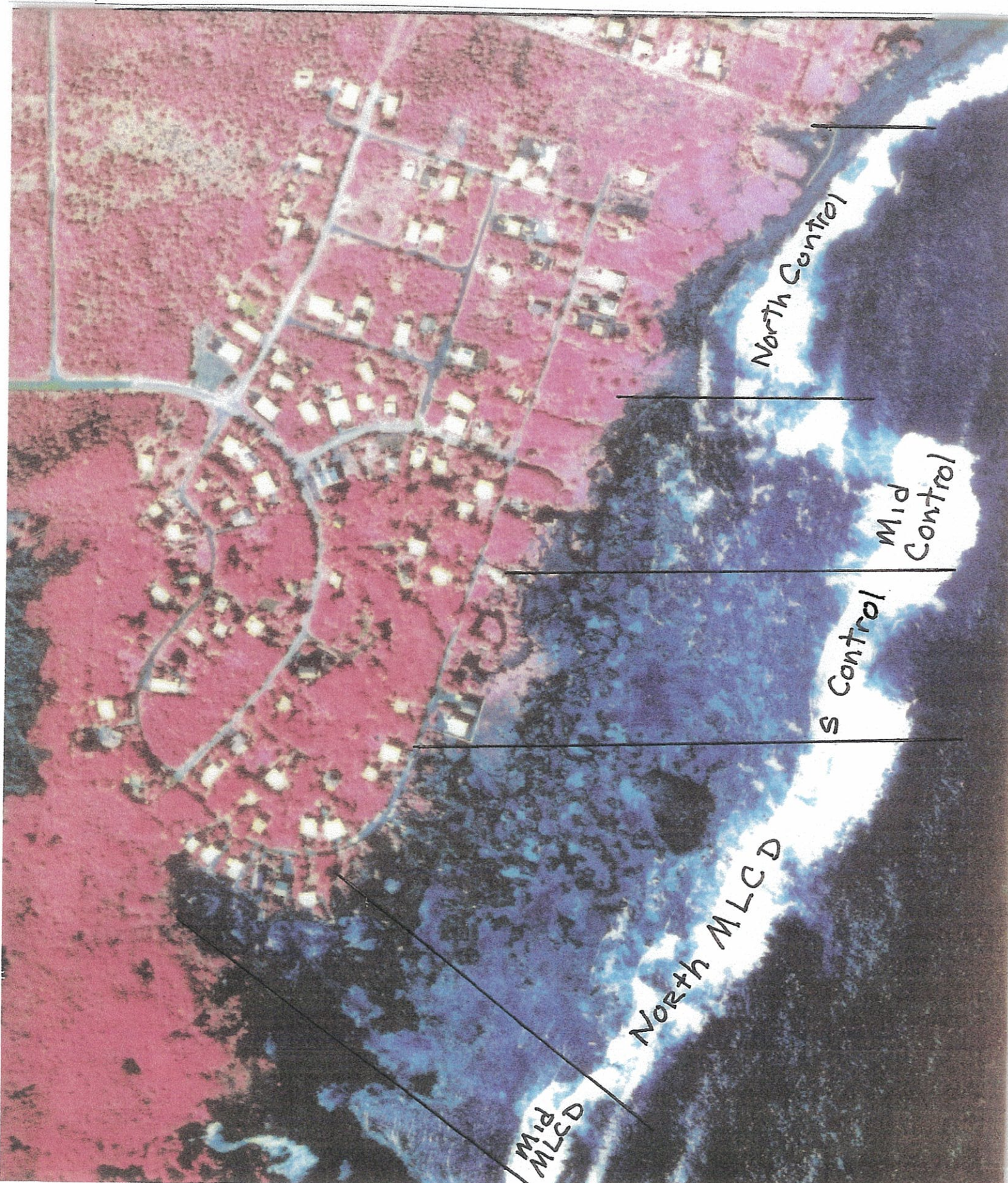
The study area includes all of the area known as the Wai'Opae tide pools in Kapoho, Hawaii. The study area includes the Marine Life Conservation District (MLCD) and the adjacent area open to fishing under the Hawaii Statewide Fishing Regulations (CONTROL). The area was stratified by management rules (MLCD vs. Control area open to fishing) and by geographic zone (southern, middle and northern portion) of MLCD and of the Control area. See Figure 1 for boundaries of areas and zones.

Reef Stewards counted the number of people fishing by gear type (e.g., lay net, spear, etc.), non-consumptive users by type of activity (e.g., snorkel, dive, kayak, beach, etc.) and/or total number of visitor cars parked along the waterfront road and the makai end of Kapoho Kai Street. During the eight-hour surveys, the Reef Steward walked throughout the study area every two hours between 9 am and 5 pm to record visitor use patterns and number of cars during each 2-hour sample period within the MLCD compared to the area open to fishing. They also talked to people violating a statewide fishing or MLCD rule and explained the rules, why they are important to follow in order to protect aquatic resources, and gave them educational brochures and litter bags to discourage littering.

Human activities were recorded using the following definitions:

- **Cars** - The total number of cars parked along the waterfront portion of Wai'Opae Street and makai end of Kapoho Kai Street within each zone.
- **Total number of people** – The number of people within each zone.
- **Lay Net** - The number of people actively fishing a stationary gill net. From one to fifteen persons have been observed fishing a single lay net.
- **Spear** - The total number of people using a Hawaiian sling, spear gun, three-prong spear, or bow and arrow.
- **Pole** - The number of people fishing with either a pole or line.
- **Hand net** - The number of people fishing for baitfish or shrimp with a hand net.
- **Gather**- The number of people gathering seaweeds or marine invertebrates without the use of nets, poles, lines or spears.
- **Snorkel** - The number of people using snorkel and mask to observe or photograph marine life but not fishing.
- **Kayak** – The number of people kayaking in the tide pools, not including offshore canoes or kayaks.
- **Beach** - The number of people enjoying the Wai'Opae tide pools as a picnic area or for sunbathing, but not fishing, snorkeling, scuba diving, or kayaking.
- **Other** - The number of people doing other activities using the following codes: scuba diving (D) (noted if diver is fishing in the comments section); camping (C); fires (F); boogie boards (B); surfing (S); and inner tubes/blow-up boats (I). Camping means the possession of a backpack, tent, blanket, tarpaulin, or other

Figure 1. Wai'Opae Tide Pool Survey Areas and Zones



obvious camping gear any time after one hour after sundown until sunrise. Fires include open fires, barbecues, gas grills, etc.

If a Reef Steward observed a violation of the state's fishing or MLCD regulations, they would explain the rules to the person. If the person would not comply with the rules, then they would notify the state's DLNR-DOCARE of the details on the standard violation report form that was developed in conjunction with DLNR-DOCARE.

On 79 days when eight-hour surveys were not possible, a two-hour survey was done to record the total number of visitor cars and the percentage that appeared to be rental cars. Rental cars were identified based on their make, age, condition, visible contents, lack of seat covers or decals, tourist guide books, and information from people associated with the vehicles.

Results

There were a total of 18 eight-hour surveys in the summer of 2007 (high season) and 79 two-hour surveys during the spring and summer.

Statistical analysis was conducted on the number of people doing each type of activity within each zone of both the MLCD and the Control area open to fishing. All data was non-normal and nonparametric tests were used. The data sets showed a significant difference in the number of people within the MLCD versus within the Control area, with significantly more people using the MLCD.

During 18 eight-hour, daytime surveys in the summer of Year Five, 40 people were counted illegally fishing within the MLCD, for an average of 2.2 per day. In Year Four and Year Three, an average of 1.9 people per day were counted fishing illegally within the MLCD during survey hours. Most of the time when the Reef Stewards recorded people fishing illegally, they also successfully convinced them to stop fishing in the MLCD and to obey the rules. Evidence of likely nighttime fishers was routinely found adjacent to both the MLCD and Control areas (discarded D cell batteries, battery packaging, swim shorts, food and liquor containers).

Table 1 provides a summary of all visitors counted during the 18 eight-hour surveys during June and July. Figures 2- 21 provide more details about the human use patterns at the Wai'Opae tide pools during the summer of 2007.

Figures 2 and 3 show the overall percent of the consumptive and non-consumptive use in the control area and MLCD combined (the entire Wai'Opae tide pools study area).

Table 1. Total observed visitor use at Wai'Opae Tide Pools on 18 Eight-Hour Surveys June/July

	Lay/gillnet	Thrownet	Spear	Pole/line	Handnet	Gather	Total	Snorkel	Kayak	Beach	Other	TNC	Total	Total use Avg/day
							Fishing					use	use	
<u>Weekends/Holidays</u>														
CONTROL	8	8	42	67	0	19	144	68	0	259	24	351	495	62
MLCD	0	0	2	11	7	0	20	1357	14	1527	132	3030	3050	443
TOTAL	8	8	44	78	7	19	164	1425	14	1786	156	3381	3545	505
<u>Weekdays</u>														
CONTROL	18	6	21	19	0	4	68	54	0	75	10	139	207	21
MLCD	0	2	0	3	8	7	20	1101	5	997	24	2127	2147	215
TOTAL	18	8	21	22	8	11	88	1155	5	1072	34	2266	2354	236

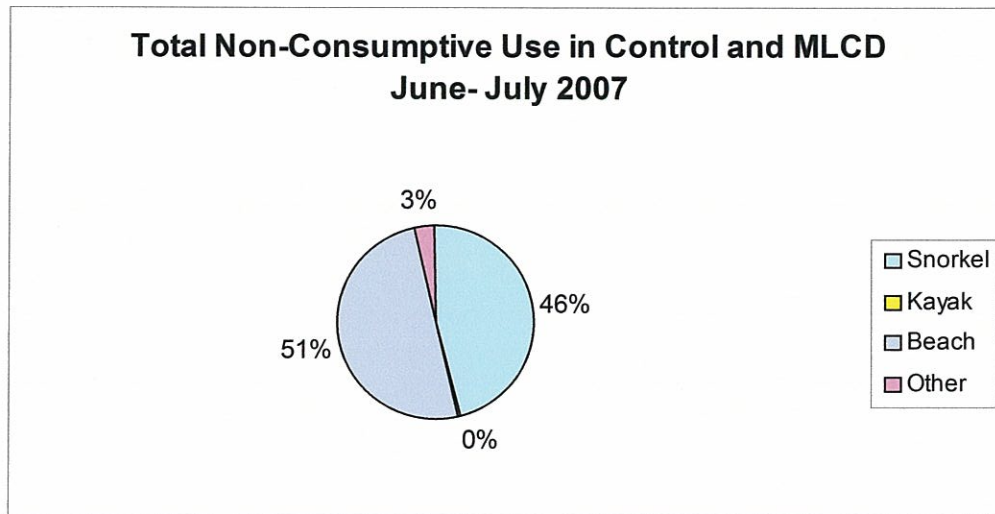


Figure 2. Total percent of non- consumptive uses in the Control and the MLCD areas of Wai ‘Opae.

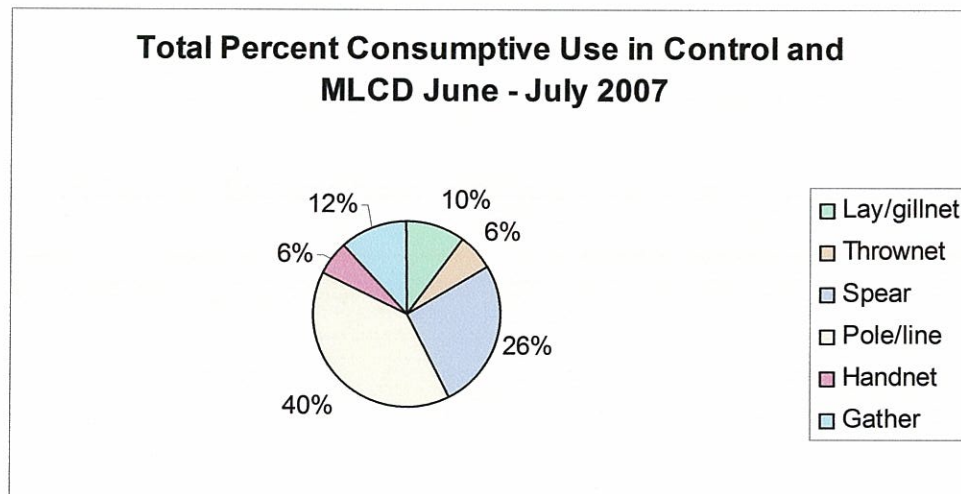


Figure 3. Total percent of consumptive uses in the Control and MLCD areas at Wai ‘Opae.

Beaching and snorkeling had the highest rates for the non-consumptive uses at Wai ‘Opae tide pools. Pole line fishing had the highest rate of consumptive use at Wai ‘Opae in the Control and MLCD areas. The overall total of the consumptive and non-consumptive uses between the Control and MLCD are presented in figures 4, 5, 6, and 7. The graphs are set up to show the total amount of activity within each zone.

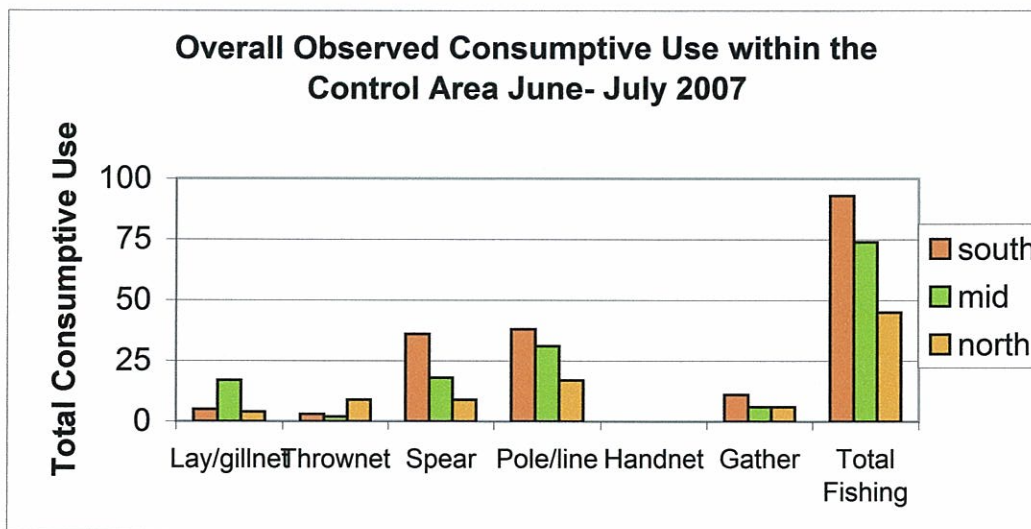


Figure 4. Total observed consumptive use by different types of fishing methods in the Control area (18 survey days).

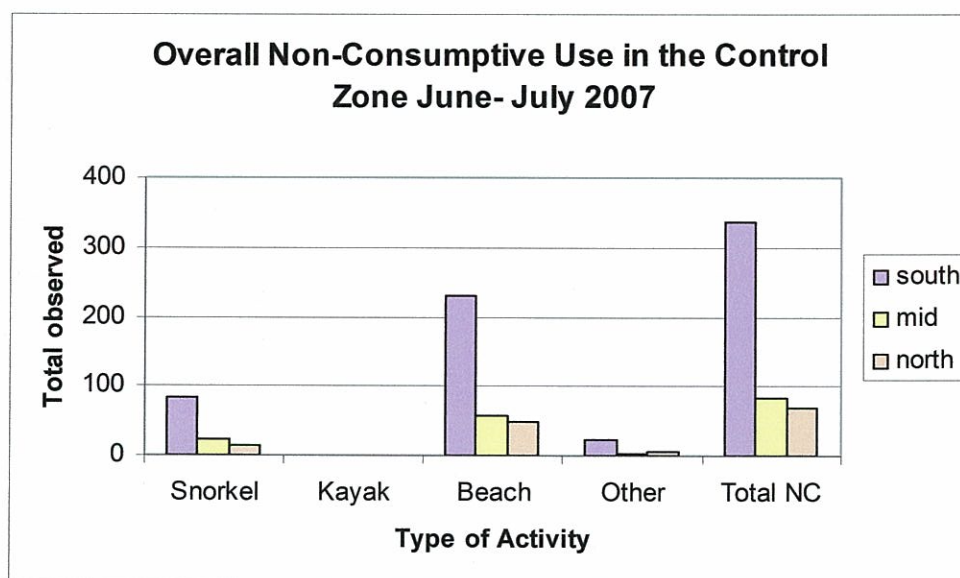


Figure 5. Total non-consumptive use by different types of activities observed in the Control area of the Wai 'Opae tidal pools (18 survey days).

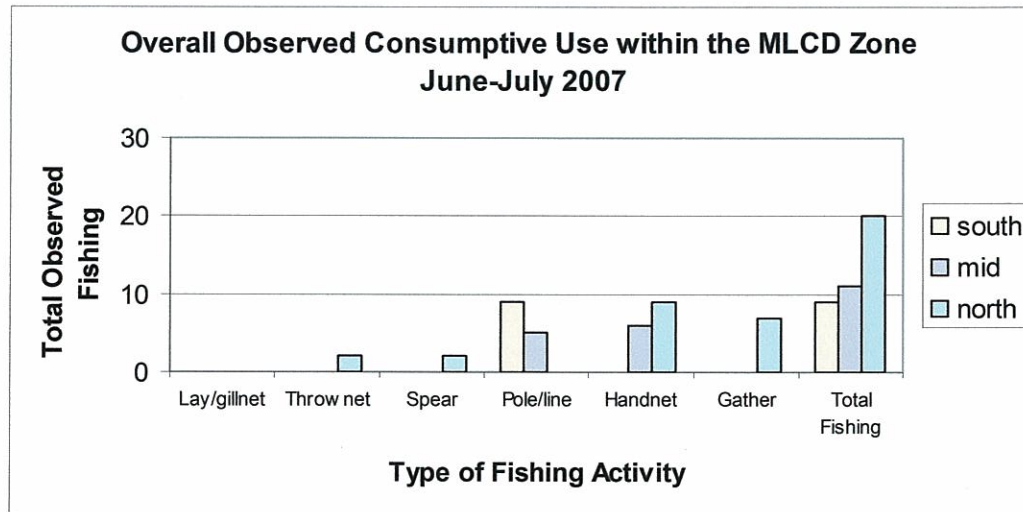


Figure 6. Total observed consumptive use by different fishing methods in the MLCD area (18 survey days).

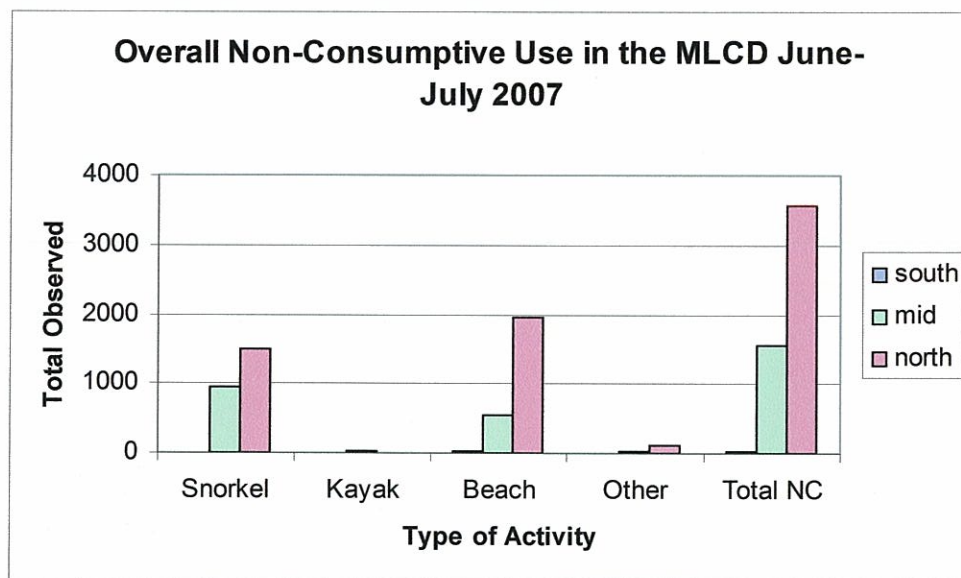


Figure 7. Total observed non-consumptive use by different types of activities in the MLCD area at Wai 'Opae (18 survey days).

The main findings are that there is very high non-consumptive use in the MLCD, concentrated in the northern portion of the MLCD. Beaching and snorkeling are the most popular non-consumptive activities that are taking place at Wai 'Opae. More people also use the Control area for non-consumptive use than for consumptive use. In view of the results obtained for the consumptive use within the Control and MLCD zones, consumptive use is largely taking place in the Control area, mainly in the southern portion of the Control area. Pole and line fishing and spear fishing are the most popular gear choices amongst fishers. This relates to the boundaries of the MLCD as the southern zone of the Control area borders the northern portion of the MLCD. All the people that

were recorded fishing in the North MLCD were redirected to go into the South Control area and beyond. Most of the people who were redirected stayed very close to the boundary between the Control and the MLCD. It is presumed that the South Control area was a high consumptive use spot for people to fish because it was close to the MLCD.

In the analysis of non-consumptive and consumptive uses at Wai 'Opae, the datum were stratified by weekend/holiday vs. weekday and by consumptive vs. non-consumptive use within the Control and MLCD areas and each of their three zones. In the graphs below, you can see the rates of human use on weekends/holidays compared to on weekdays.

Summer Weekends and Holidays

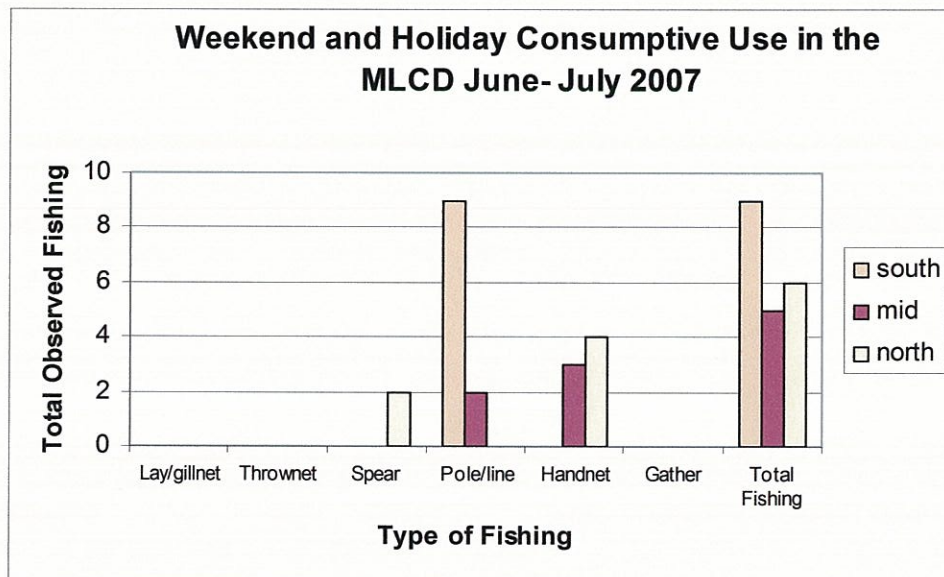


Figure 8. Total weekend and holiday consumptive use of the different types of fishing observed in the MLCD area of Wai 'Opae (8 survey days).

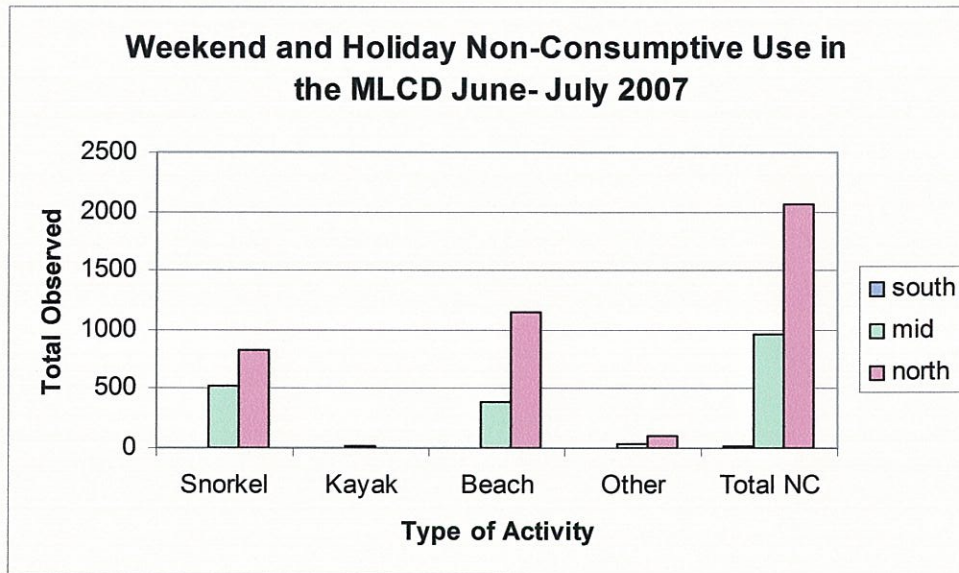


Figure 9. Shows the total weekend non-consumptive use of the different activities observed in the MLCD area of Wai 'Opae (8 survey days).

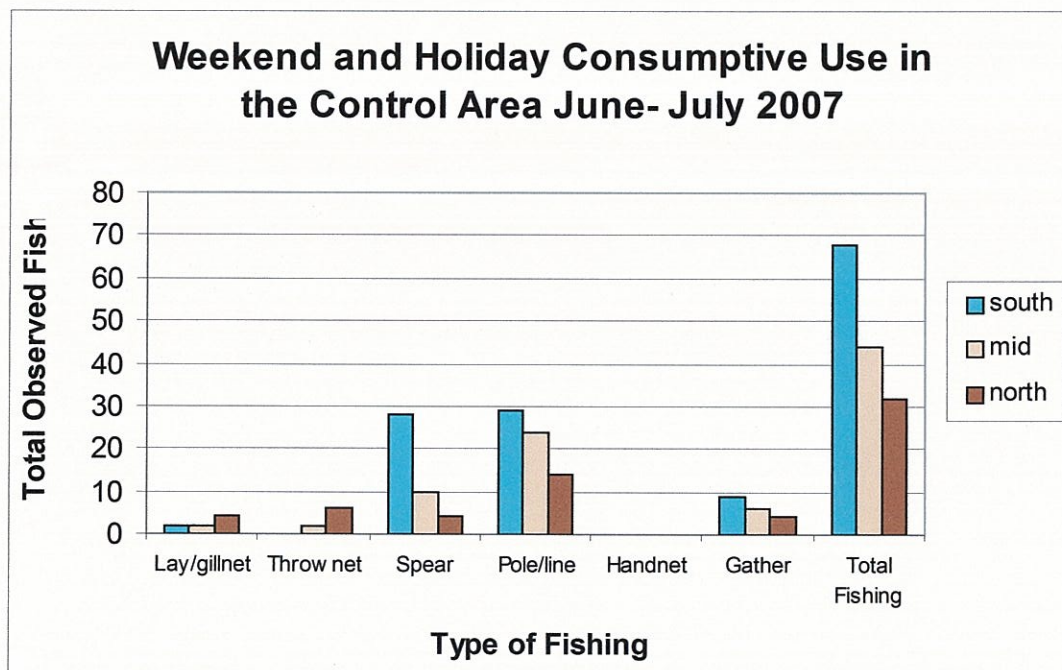


Figure 10. Shows the total weekend consumptive use by the different type of fishing observed in the Control area of Wai 'Opae (8 survey days).

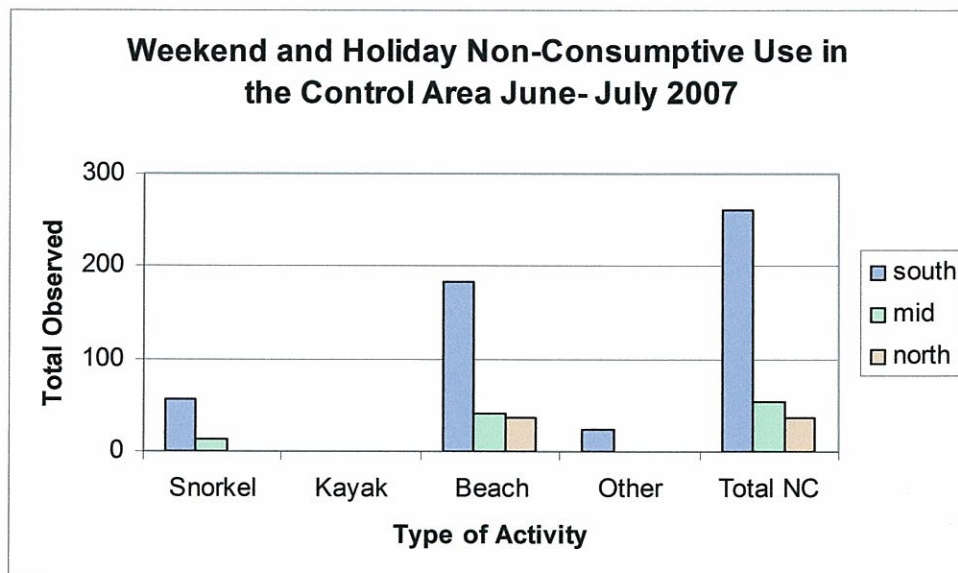


Figure 11. Demonstrates the total weekend non-consumptive use of the different types of activities observed in the Control area of Wai 'Opae (8 survey days).

The consumptive use recorded in the MLCD mainly occurred in the southern portion, which is far more remote and harder to access than the mid and north zones. Pole and line fishing was the method preferred. There were 20 illegal fishers recorded in the MLCD during the eight eight-hour daytime surveys. Fishing activities dominated in the Control area, with 144 fishers recorded during the eight eight-hour daytime surveys. Pole and line and spear fishing were the preferred gear types used in the Control area during the weekends and holidays.

There were 3,030 non-consumptive users recorded in the MLCD and only 351 in the Control area during the eight eight-hour daytime surveys.

Summer Weekdays

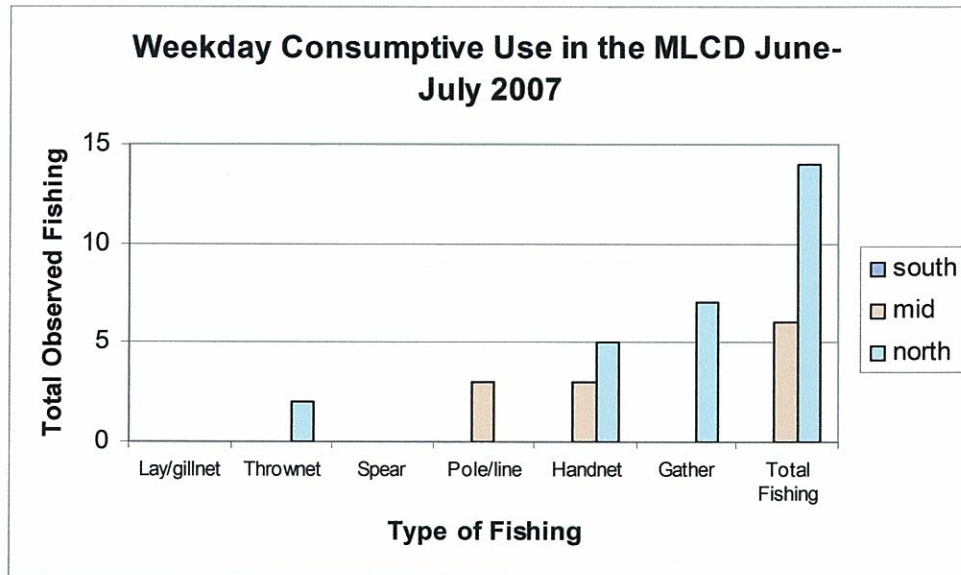


Figure 12. This graph shows the total weekday consumptive use by the different fishing methods in the MLCD area of Wai 'Opae (10 survey days).

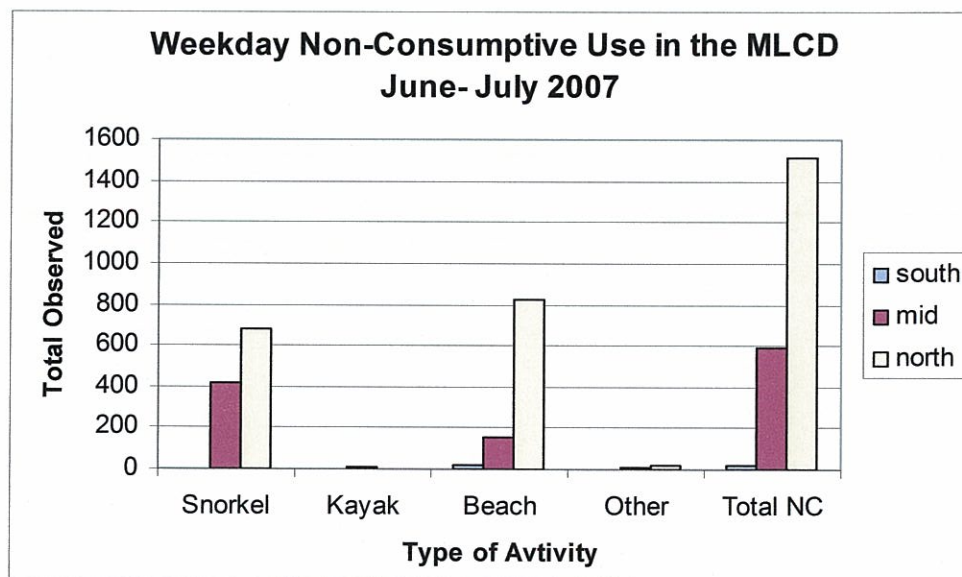


Figure 13. Shows the total weekday non-consumptive use by the different activities in the MLCD at Wai 'Opae tide pools (10 survey days).

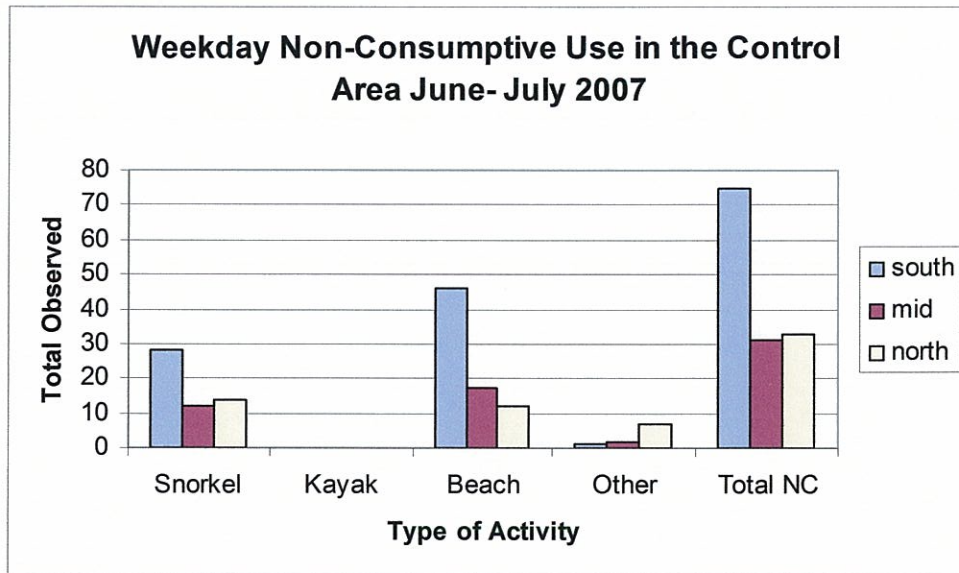


Figure 14. Demonstrates the total weekday amount of non-consumptive use by different activities in the MLCD zone at Wai 'Opae (10 survey days).

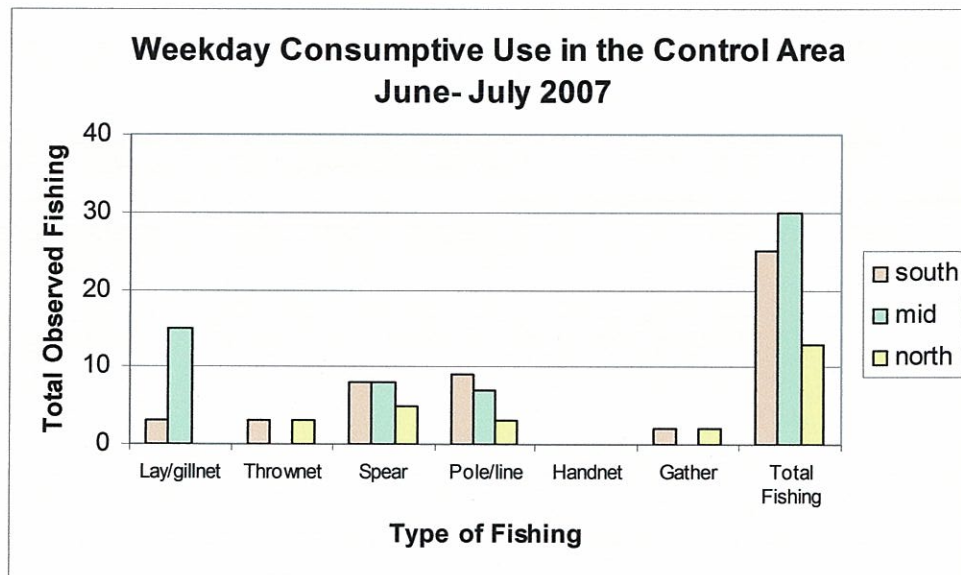


Figure 15. This bar graph demonstrates the total weekday consumptive use by the different fishing methods in the Control area of the Wai 'Opae tide pools (10 survey days).

There is a trend in the consumptive use in the MLCD, as shown in figure 12. More people fished in the North MLCD compared to the Mid and South MLCD on weekdays. There were 20 illegal fishers recorded during the 10 eight-hour daytime surveys in the MLCD on weekdays versus 68 in the Control area. The relative use of the different zones differed from the patterns of illegal fishing on the weekends and holidays when there are far more people using the tide pools and a security guard. This greater human

presence likely drove the illegal fishers into the more remote southern zone of the MLCD. The level of illegal fishing is small compared to the dominant non-consumptive uses in the MLCD.

As expected, the non-consumptive use in the MLCD is high and far higher than in the adjacent Control area. There were 2,127 people observed over the 10 eight-hour surveys in the MLCD versus only 139 in the Control area. Most of the activity is occurring in the North MLCD next to the designated reef parking lot provided by the adjacent community.

There were 68 fishers recorded in the Control area during the 10 eight-hour daytime surveys. Most of the consumptive use occurred in the Middle zone, with lay nets being the preferred fishing gear. A lot of the fishing on weekdays occurred early in the morning and late in the afternoon. The lay net fishers were primarily Micronesian men of young and old who were lay netting together (pa'ipa'i style).

Most of the non-consumptive use in the Control area took place in the South Control area. It appears that when there are crowds of people in the North MLCD, many visitors move into the South Control area to escape the more crowded MLCD. Many locals used the South Control area to escape the tourists concentrated in the MLCD.

Below are graphs that show the daily average human use in each of the Control and MLCD zones. Averages are presented for weekends/holidays and weekdays combined (18 survey days), weekends/holidays (8 survey days), and weekdays (10 survey days).

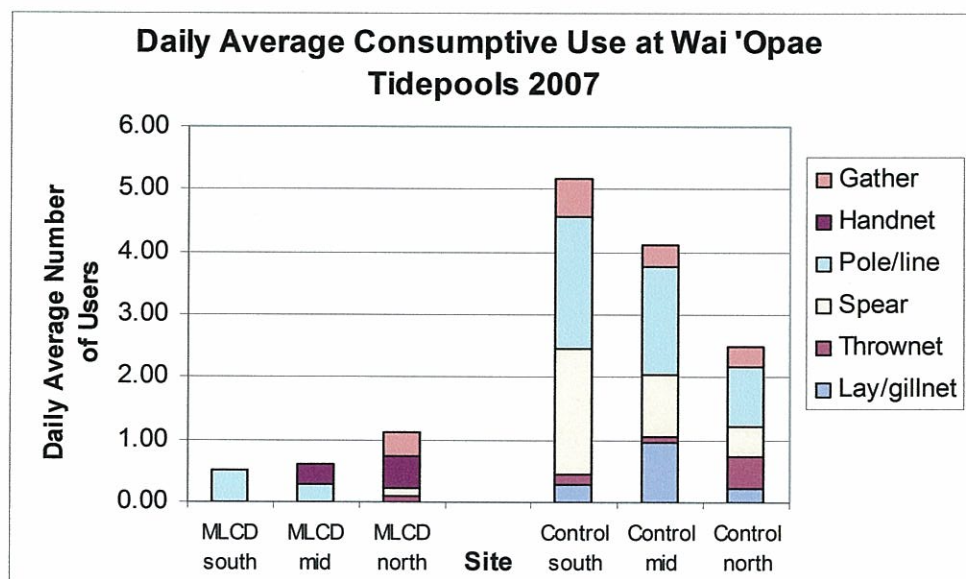


Figure 16. The total daily average consumptive use at Wai 'Opae (based on 18 survey days, with 8 survey days on the weekends/holidays and 10 survey days on the weekdays).

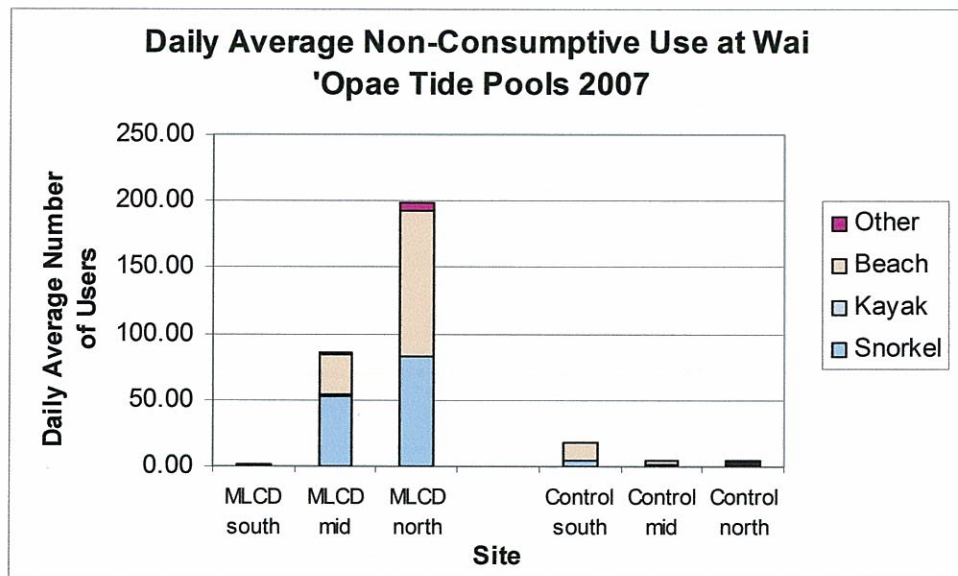


Figure 17. The total daily average non-consumptive use at Wai 'Opae (based on 18 survey days, with 8 survey days on the weekends/holidays and 10 survey days on the weekdays).

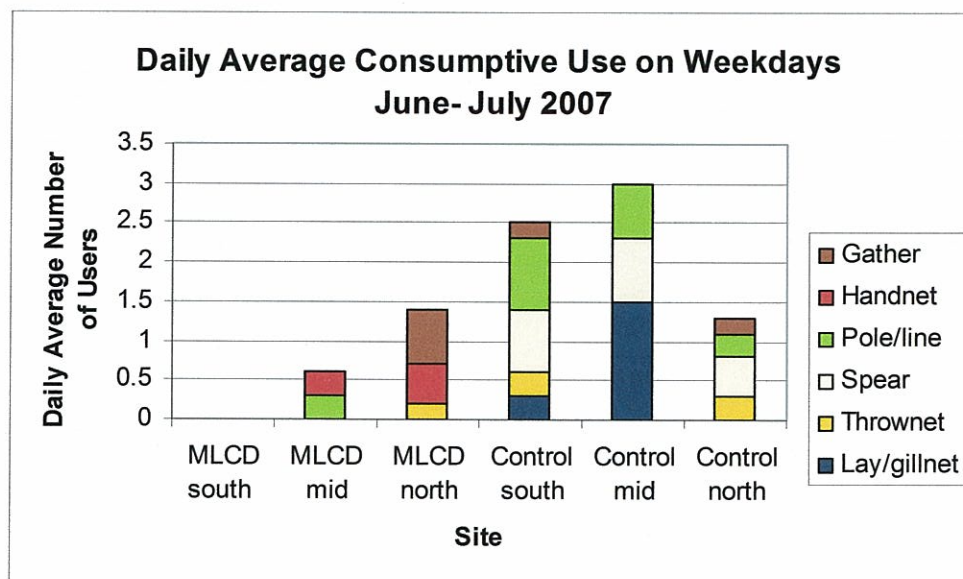


Figure 18. Describes the daily average consumptive use on weekdays (10 survey days).

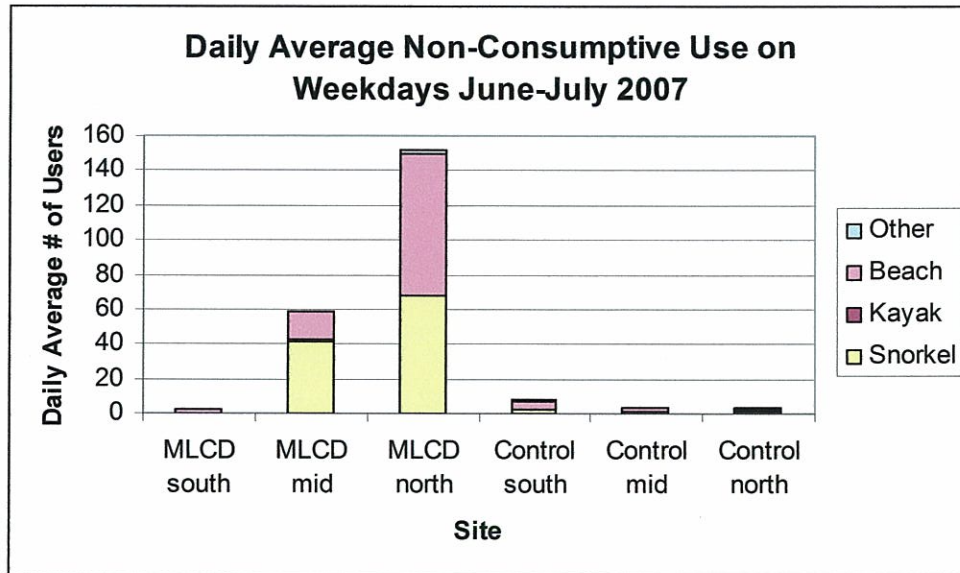


Figure 19. This graph shows the daily average of the non-consumptive use on weekdays at Wai ‘Opae (10 survey days).

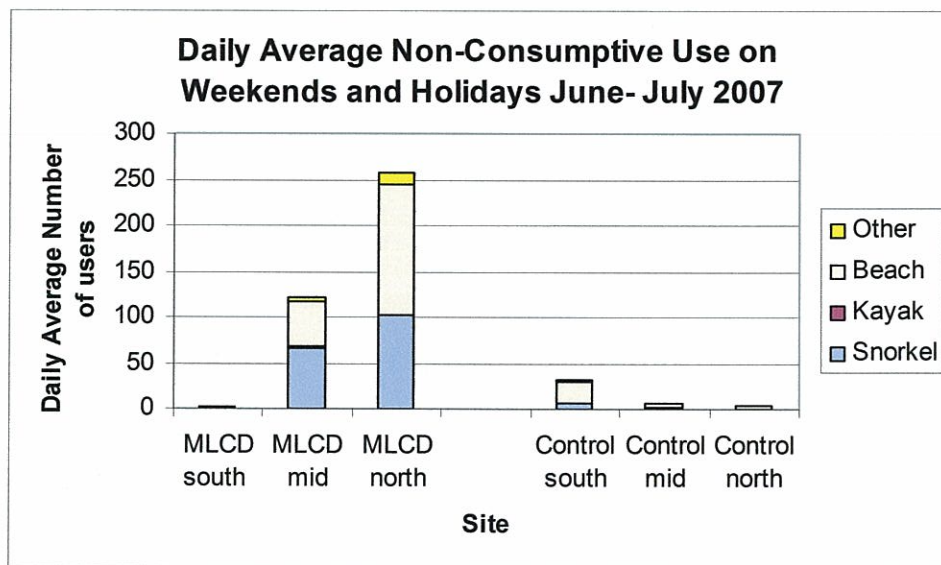


Figure 20. The bar chart describes the daily average of the non-consumptive use on weekends/holidays at the Wai ‘Opae tide pools (8 survey days).

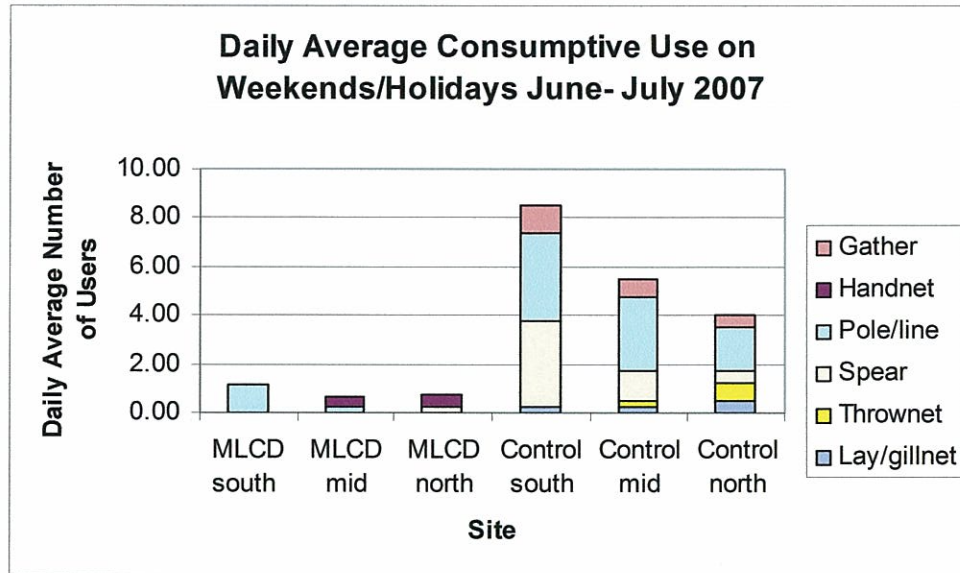


Figure 21. This bar graph shows the daily average of the consumptive use on the weekends/holidays at Wai 'Opae tide pools (8 survey days).

The weekend/holiday bar charts demonstrate that the average number of consumptive users in the Control area was 18 people per eight-hour daytime survey. In the MLCD on weekends, there were an average of 2.5 people per day illegally fishing. For the weekend/holiday non-consumptive use in the MLCD, there was an average of 379 people per day that used the tide pools. In the Control area, the average number of people using the tide pools for non-consumptive use was 44 people a day.

The weekday bar graphs reveal high averages also. The daily average of consumptive users in the MLCD was two people per eight-hour daytime survey, not that much different from the average consumptive use on weekends (2.5). This is far lower than the seven fishers per day in the Control. The non-consumptive use on the weekdays in the MLCD averaged 213 people per eight-hour daytime survey, versus 14 in the Control area.

The data clearly document non-consumptive and consumptive use on weekends/holidays is higher than on weekdays.